

**USDA**  
**NATURAL RESOURCES**  
**CONSERVATION SERVICE**  
  
**DELAWARE CONSERVATION**  
**PRACTICE STANDARD**

**IRRIGATION WATER**  
**MANAGEMENT**

**CODE 449**  
**(Reported by Ac.)**

**DEFINITION**

Irrigation water management is the process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned, efficient manner.

**PURPOSES**

Irrigation water management is applied as part of a conservation management system to support one or more of the following:

- Manage soil moisture to promote desired crop response
- Optimize use of available water supplies
- Minimize irrigation induced soil erosion
- Decrease non-point source pollution of surface and groundwater resources
- Manage salts in the crop root zone
- Manage air, soil, or plant micro-climate

**CONDITIONS WHERE PRACTICE**  
**APPLIES**

This practice is applicable to all irrigated lands.

An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, etc.) must be available and capable of applying water to meet the intended purpose(s).

**CONSIDERATIONS**

The following items should be considered when planning irrigation water management:

- Consideration should be given to managing precipitation effectiveness, crop residues, and reducing system losses.
- Modify plant populations, crop and variety selection, and irrigated acres to match available or anticipated water supplies.
- Consider potential for spray drift and odors when applying agricultural and municipal wastewaters.
- Equipment modifications and/or soil amendments such as polyacrylamides and mulches should be considered to decrease erosion.
- Consider the quality of water and the potential impact to crop quality and plant development.
- Quality of irrigation water should be considered relative to its potential effect on the soil's physical and chemical properties, such as soil crusting, pH, permeability, salinity, and structure.
- Avoid traffic on wet soils to minimize soil compaction.
- Consider the effects that irrigation water has on wetlands, water related wildlife habitats, riparian areas, cultural resources, and recreation opportunities.
- Management of nutrients and pesticides.
- Schedule salt leaching events to coincide

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

with low residual soil nutrients and pesticides.

- Water should be managed in such a manner as to not drift or come in direct contact with surrounding electrical lines, supplies, devices, controls, or components that would cause shorts in the same or the creation of an electrical safety hazard to humans or animals.
- Consideration should be given to electrical load control/interruptible power schedules, repair and maintenance downtime, and harvest downtime.
- Consider improving the irrigation system to increase distribution uniformity of irrigation water application.

### **CRITERIA**

#### **Criteria Applicable to All Purposes**

All work shall comply with Federal, State, and local laws, rules, and regulations. Water shall not be applied in excess of the needs to meet the intended purpose.

#### **Additional Criteria to Manage Soil Moisture to Promote Desired Crop Response**

The following principles shall be applied for various crop growth stages:

1. The volume of water needed for each irrigation shall be based on plant available water holding capacity of the soil for the crop rooting depth, management allowed soil water depletion, irrigation efficiency, and water table contribution.
2. The irrigation frequency shall be based on the volume of irrigation water needed and/or available, the rate of crop evapotranspiration, and effective precipitation.
3. The application rate shall be based on the volume of water to be applied, the frequency of irrigation applications, soil infiltration and permeability characteristics, and the capacity of the irrigation system.

#### **Additional Criteria to Optimize Use of Water Supplies**

Limited irrigation water supplies shall be managed to meet critical crop growth stages.

#### **Additional Criteria to Minimize Irrigation Induced Soil Erosion**

Application rates shall be consistent with local field conditions for long term productivity of the soil.

#### **Additional Criteria to Decrease Non-Point Source Pollution of Surface and Groundwater Resources**

Water application shall be at rates that minimize transport of sediment, nutrients, and chemicals to surface waters and that minimize transport of nutrients and chemicals to groundwater.

#### **Additional Criteria to Manage Salts in the Crop Root Zone**

The irrigation application volume shall be increased by the amount required to maintain an appropriate salt balance in the soil profile.

The requirement shall be based on the leaching procedure contained in the National Engineering Handbook (NEH) Part 623, Chapter 2.

#### **Additional Criteria to Manage Air, Soil, or Plant Micro-Climate**

The irrigation system shall have the capacity to apply the required rate of water for cold or heat protection as determined by the methodology contained in NEH Part 623, Chapter 2.

### **PLANS AND SPECIFICATIONS**

Application of this standard may include job sheets or similar documents that specify the applicable requirements, system operations, and components necessary for applying and maintaining the practice to achieve its intended purpose(s).

## **OPERATION AND MAINTENANCE**

There are no Operation and Maintenance (O&M) aspects applicable to this standard. Necessary O&M items are addressed in the physical component standards considered companions to this standard.

## **SUPPORTING DATA AND DOCUMENTATION**

Application of this standard shall include preparation of an irrigation water management plan that specifies the applicable requirements, system operations, and components necessary for applying and maintaining the practice to achieve its intended purpose(s). As appropriate, the plan should include sections on the following:

1. Resource inventory
2. Objectives
3. Water source (quantity and quality)
4. System design and components (pump, flow meter, injection equipment, filters, nozzles, etc.
5. Soil characteristics (water holding capacity, intake rate, etc.)
6. Crop characteristics (evapotranspiration rate, critical growth periods, etc.)
7. Irrigation scheduling (soil moisture monitoring, weather data, etc.)
8. Operation guidance
9. Maintenance guidance
10. System evaluation guidance